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AN ESSAY

— ON —

The Natural Habits and Mode of Destroying

THE CURCULIO,

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DELIVERED BY

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W. B. RANSOM,

ST. JOSEPH, - MICHIGAN

Before the Berrien County Horticultural Association,

FEBRUARY 25, 1871.

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## Berrien County Pomological Society.

The society met at the Congregational Church in Benton Harbor, on the 25th ult. A very large number of practical fruit growers were present. The event of the meeting was the essay of W. B. Ransom, Esq., on the curculio. It was received with great satisfaction and the society immediately passed a unanimous vote of thanks, and resolved, to print an edition of 1000 copies in pamphlet form for general distribution. The following is the copy of the essay:

### ESSAY ON THE CURCULIO.

*Mr. President; Ladies and Gentlemen of the Association*—At your request I will present the knowledge I have obtained during the last two years, concerning a little darkish, snouted beetle, known by practical fruit growers as the "curculio." This little insect, which destroys such a large portion of fruit in the United States, resembles in shape when curled up, a grape or raisin seed; it looks very much like a dead plum or peach bud, and is from a fourth to a sixth of an inch in length, varying much in size.

This is the insect which practical fruit growers have to contend with. By practical, I mean those who are aware of the destructive habits of this insect enemy of our fruits, and who diligently apply all known remedies to its destruction. It is known, or called usually by unpractical fruit growers, who learnedly talk of its habits, its mode of operation, and of many kinds of preventives, as the "kurkuloo." Most of these persons never saw one, nor could tell the insect if shown them. An individual of this class, (and a prominent man of Berrien county,) came to me last summer to tell me a secret he had found out about the "kurkuloo." He said a little fly, the bees, or something laid an egg in the blossom, and when the fruit grew, it covered it up, so that it hatched a worm which destroyed the fruit. Wonderful discovery! Like many of the preventives in vogue.

Another class of persons write fine scientific descriptions of the curculio, give it high sounding names in Latin, describe its species, genera, order and habits to some extent. Riley calls it "Conotrachelus nenupher." Faber calls it "Rhynchonenus nenupher." They tell many things useful, and many that practical fruit growers have no faith or confidence in. In fact very many things said only serve to lead us astray. These satans give too much theory and not enough of their own experience and practical knowledge. Horticultural and agricultural papers are full of the silliest remedies and preventives imaginable. The consequence is, we look to remedies as preventives instead of taking the book of nature, open daily in our orchards to study their natural habits, and thereby discover the easy and natural mode of their destruction.

Of all the modes yet discovered to save our fruit, none is found efficient but *killing* the beetles and larvae. So far as offensive odors are concerned, either on, around, or under the trees, saving the fruit, we may just as well whistle "Yankee Doodle," or "Hail Columbia." The quicker we discard all preventives but death, the sooner will we come to the practical safeguard to our fruit. The entire extinction of the species is not at once to be thought of; but what I call practical fruit growers, can and will keep the curculio in check so as to be rewarded for their labor and diligence in using those means which are now known to capture and destroy them. That there will be a class of drones, who will leave this work undone, we may expect; but this should not lessen our efforts. It should increase them.

The different methods for curculio destruction embrace, First, that of trapping under small pieces of bark, blocks, or anything flat with a surface of from two to four inches placed around the collar of the tree, after making the ground clean and smooth, so that the curculio can find no other covert near the tree. Most of you practiced this mode of destruction last year to a considerable extent, with satisfactory results. Your experience was such as to disprove the entomologist's assertion, that "they could only be taken in limited numbers, when the nights were cool, and before the trees were in bloom and foliage." Although the curculio

were not all taken in this way, it has been said to me by intelligent fruit growers, that more were killed last year in this way (notwithstanding the lateness of its discovery), than all that had ever been killed in this fruit region from the first, by all other means.

Second, the jarring process, wherein a large sheet is held or spread under a tree, then, striking the limbs with a rubber mallet of two or three pounds weight, the curculio are jarred down and afterwards killed. Some have the sheet stretched on a frame, to be carried and struck against the tree; and another mode of jarring is a kind of umbrella frame covered with cloth, and run on a wheel against a tree. This is known as Dr. Hull's machine.—Gen. Ward, of Benton Harbor, has a curculio catcher, which is said to be far superior to Dr. Hull's. Although these machines will catch great numbers of the insects, there are many objections to them. First, the expense of using them; second, the danger of marring the trees in order to use them efficiently in jarring the curculio off; third, with any amount of force in striking the trunk of the tree, only a portion of the curculio will be jarred off, as I have tested by using a mallet on the limbs immediately after striking the tree with a bumping catcher. I caught almost twice as many.

The only other mode is by thoroughly destroying the larvae by picking up the fallen wormy fruit, or letting hogs run in the orchard and make pork or trichina of them before they get to be hard shells or get "*their back up*." This method will be effective in destroying thousands a year before they can do us any damage.

The curculio are quite continuous in feeding. Beginning immediately after emerging from the ground, about the last of July, the curculio commence feeding and continue even as late as October.—They will feed on peaches, blackberries, quinces, and probably any kind of fruit during the latter part of the season. One, or all of these modes combined, will be the price paid in a short time for all the fruit ripened where the curculio has gained in numbers as in this region, in Southern Illinois, and in many other places. I am told that at Cleveland it is nearly impossible to raise a cherry, free from this well-known Turkish crescent mark. Every fruit grower who neglects,

in this fruit raising vicinity, to destroy this insect thoroughly, is doing a wrong to others, and should be branded with the crescent mark on his forehead which Cain had on his, and he should be driven out to feed like one of old on the grass of the field like the ox, and his lips should never touch our luscious fruits.

To my mind some or all of these methods are necessary to success in saving our fruits from this little *black snouted cuss*, (I do not speak profanely of him, but reverently), I mean accursed, as the flaming sword was to guard the fruit of Eden. It is said by persons who have lived in the St. Joseph fruit region from the time the first peach trees were planted, that the apricot, nectarine, plum and all stone fruits grown here then, were fair and free from the puncture of the curculio as the fruit of Paradise.

Now, with all our efforts, it is thought by good judges (and I have asked the opinion of many competent fruit growers) that we lose from one half to two-thirds of our fruit crop when the season favors anything less than a full general crop. A gentleman remarked to me a few days ago, that last year he noticed many orchards which set a fair crop, but the fruit kept disappearing like the summer dews, till there was none left.

If we were more thorough in curculio destruction, it would save Chicago the expense of sending her proposed missionaries among us, to convert us from sending them early, "*Hale's early*," that are "*somewhat peculiar*." Let us attend to this missionary labor among ourselves, and Chicago go forth with her exuberant feeling of love to the poor "*heathen Chinese*."

Mr. Elliot tells us, when he published his book on fruit in 1854, that the curculio had not been known in the west but a few years; while now its numbers are legion. It swarms on our fruit almost like the locusts of Egypt. For the past fifty years horticulturists have been looking for a preventive to their ravages. Pomologists have inquired for varieties of fruit which curculio would not touch, or some application to the tree to make it offensive to them, so as to compel them to leave the fruit in disgust. Notwithstanding the curculio have a preference for fruit of particular varieties and kinds, they are not remarkably fastidious. Their



snout was made to drill fruit and it must do it. It must work at some kind of fruit if not as agreeable to them as others.—They cannot be idle.

Having read everything my eye ever lit upon about the curculio, for the last thirty years, it is absolutely astonishing how much has been written on the subject and to how little purpose.

Except the three methods I have spoken of as means of destroying them, nothing better ever has been discovered. The many recipes, preventives and methods to save our fruit are innumerable.—An old preventive was to cut down the trees, with the remark "I never get any fruit." This, instead of killing the destroyer, killed the tree. This was effectual. I do not believe anything but death will stop that horny snout from piercing into our young stone fruits. It is amusing to see what is written as successes in saving a crop of fruit, the many recipes given are supremely ridiculous.

For instance, sprinkling Paris green under and on the trees; sprinkling dust, lime, sulphur, salt, in the trees; throwing with a syringe whale oil soap on the trees; liquid manure, etc., etc.; bags of salt put in the forks of the trees; tobacco water; sweet elder branches hung in the trees; assafetida; phosphorus; tar around the trees; tarred shingles hung in the branches; cotton batting tied around the body of the trees to prevent their crawling up; as though their wings were made for ornaments and not for use. Some have recommended plowing them in; spading them in; piling large piles of stone around the trees; paving under the trees, etc.—A hundred of such remedies I might continue to mention, of equal sense and of equal value. While all these panaceas only delude the experimenter and keep him from efficient means of destruction, the curculio enjoys them as a perfumery offered only to his highest sense of enjoyment as a co-worker in the perfumery art, in its elevating and refining influence upon his race. Nothing short of the flaming sword of death, severing the joints and the marrow of them is of any utility, or efficiency.

I admit that cultivating and passing around the trees frequently, putting chicken coops under the trees or moving around the trees often disturbs them in a measure, and may to some extent save a

portion of the fruit. Hens roosting in the trees is perhaps as good as anything but death on them, from the fact the curculio operate almost exclusively by night. Fowls only disturb, but do not destroy them, by roosting on the trees.

Some one has proposed to raise trees on little islands so the fruit stung would fall in the water. This only would destroy the larvae, and the same could be done by picking up the fallen fruit; though it is claimed they will not attack the fruit thus exposed to the water because instinct governs them to preserve their larvae; but this practice of planting trees would be wholly impracticable to any extent.

It is known that the peach, containing the larvae, put into barrels of water will remain weeks without destroying them, because when afterwards emptied they become active and enter the ground. The custom was to pick up the fallen wormy fruit and empty it in the river.—But observation discovered the fact that the peaches lined the shore of the river and lake, where many of the larvae undoubtedly enter the ground, and come forth transformed to prey the next year on our fruit. I put some apples in a breeding jar last summer to let the larvae mature, in order to breed them to the perfect beetle. The apples decayed some where cut, and discharged some liquid in the bottom of the jar with the sweat of the apples. Two larvae came out and I let them lie in the liquid a week or two till apparently dead, bleached white. One day I took them and put them on some earth, and after some time they became somewhat dry and very soon went freely into the ground. I put some into a jar Sept. 21st, and Sept. 29th the larvae had his wing process developed; Oct. 16th wings and legs were formed, the beetle colored and quite hard, but not come out of the cavity where he transformed. I will here say that all the curculio I bred from apples were the common plum curculio. I do not know of having ever seen any of Dr. Hull's "anthonomus quadrigibbus," or apple curculio.

We have never carefully and thoroughly enough studied the natural habits and rules of international law of this Turkish Mahamedan emperor. We know we pay tribute as a Christian people to his majesty. A tribute more excessive than is paid to any monarch on the globe. Yet;

we pay—pay—PAY year after year, with careless supineness of theorizing remedies. He takes of our wealth asking no questions for conscience sake, (if conscience a "Turk" has), with a Mahamedan's rights, over a Christian people; and the most we say or do is, when we are gathered together in full numbers as to-day, and out of his presence;—"the little Turk!"

We now want to marshal our forces, learn all his habits and rules of warfare, and to a man compel his surrender.—Proclaim our rights to our domain—say, "millions for defense but not one peach for tribute."

It is known in this community that I made the new discovery last year of trapping them under small pieces of bark, blocks, bits of boards, lath, chips, stones, pieces of bricks, bunches of matted leaves, corn cobs, or anything with a flatish surface from two to four inches square placed around the collar of the trees on the ground after making it level and smooth to the distance of three or four feet from the tree; or if smooth and clean for a larger distance, so much the better. The object of making the ground clean and smooth is, that they may find no hiding place but the traps or coverts prepared for them.

The curculio is principally a nocturnal insect in its habit of feeding and depositing its eggs. They move comparatively but little during the day except to crawl on the ground, and when in the orchard, under its rubbish, will crawl toward the trees during the day; especially when disturbed by working the orchard. They crawl with great rapidity and when they reach the tree during the day, until just at evening—very few will ascend the tree if they can find a hiding place near it.

This mode of capturing them the past season was highly satisfactory to persons who properly prepared the ground and traps, except to a few savans who have spent years in instructing us on their habits and the mode of destroying them.—The only crotchet in their mind that I am able to perceive, is that the most efficient way to destroy the curculio was discovered by a fruit grower, and not by a professional; and I am bold to assert, notwithstanding the warning notes of these savans, that this mode will, if followed,

destroy more curculio than any other yet discovered. There are many here to-day who have used all other means, that can bear testimony to its efficiency and success.

Entomologists I highly appreciate as men, and their general benefit as co-assistants to horticulturists; but to proclaim the futility of this mode of destroying the curculios in the face of facts in this vicinity, weakens the faith of plebian horticulturists in scientific entomologists. Thousands, and perhaps millions, of curculios were destroyed by this simple way last year, and we hope billions will perish in the same way the coming year if there are as many in Berrien county.

My friend, Dr. Hull, who came here after the first discovery and saw these insects taken from under the traps in large numbers, went home and made a few experiments, and then wrote several columns to show that the traps were of little value, contrasting the result of his curculio catcher and his traps set. He drew the conclusion that the sheet or catcher must be used, and if used at all, the fruit grower might as well wait and catch them all at once. This reminds me of the man who had his wife cook his supper, breakfast and dinner for the next day, at evening, and let him eat it at supper, so as not to be bothered the next day. I shall only further say of the exhaustive article of the Doctor, which considers the trapping process as labor lost; that thousands can be killed before the catcher would be used and this multitude be destroyed before they can do any damage at all.

We did not expect success in Dr. Hull or my friend Riley, (though I think highly of them), for this process of catching curculio with traps was new to them, and they were not expected to be "experts." This was practical entomology; science was their profession. Dr. Hull said when here examining the discovery, that he or no one else ever heard of curculio being destroyed by such means. But with due deference to my friend Prof. Riley, who says that they could only be caught in my traps "early in the spring before the trees were in bloom, when the nights were cool and the days warm;" I would earnestly say, that we, here in Michigan respectfully dissent from such hasty conclusion. Such advice and theory is disproved here, as much as his claiming that fruit grow-



ers "were under lasting obligation" to me for the discovery, while still attributing it to Mrs. Wiers, who accidentally found some curculio gathered under lumber placed in the vicinity of some plum trees, (we are not told how near, nor of any preparation of the ground,) and in the course of two weeks caught the enormous number of 161, which a small toad could eat and swallow in fifteen minutes, and still sit and wink for his lunch. But we catch with little bits of bark, etc., two to four inches square, in two or three hours, thousands.

Now, how can Prof. Riley claim for Mrs. Wiers the discovery of this process, while she only related the fact of finding them under the boards without stating how near the trees, not even suggesting the putting of the boards, (we may suppose 12 feet long and a foot perhaps wide) near the tree or preparing the ground. She simply put it in the vicinity, having occasion to use it.

It is, and always has been known, that Mrs. Wiers' suggestion was no practical discovery, or like our method of trapping them; and what she found in regard to catching never suggested anything but a lumber pile, and that new boards. This was before the trees were in bloom. Nobody heard any more of it until our discovery, then Prof. Riley brought it up.—In his exhaustive report to the Missouri and Illinois Horticultural Societies, as to the *ultima thule* of curculio destruction, he not only discarded it, but all methods except jarring, hogs, and picking up the fallen wormy fruit. Here we join issue. Michigan may use all of these, but not solely; we will use the traps whatever else we use.

Last year I used nothing but traps, and proved to my satisfaction their superiority over the jarring process. But there is no objection to using *traps, catchers, sheets, any and all* means that will destroy a single curculio. Let all these be used! Do not discard any means that kills a single curculio!

This method of trapping was published from east to west, from north to south over the Union—in two weeks time, and tried as an experiment in all parts.—Where the preparation was proper and not too late in the season, persons destroyed the beetles in large numbers. In this vicinity it was very satisfactory. I

have received the highest testimony of its success, while Mrs. Wiers' discovery was still-born, and buried without a christening ceremony or name. It was only resurrected to take from aspiring entomologists the cloud of surprise that all horticulturists expressed, that they had not before discovered so simple a remedy. Prof. Riley's experiment was no better than Dr. Hull's with traps; from his experience and practice he warns all his Michigan friends against any confidence in them. This is gratuitous advice. It would be good if true! We have, however, learned by practice, to put faith in curculio traps. Sincerity or pride might have prompted this advice to destroy our confidence in this successful mode of capture. Last year curculios were killed by thousands and hundreds of thousands, yet the majority who used the traps began late in the season. My curculio crop amounted to over 40,000 by actual count, and mostly from 400 trees. It was thought generally a better year for curculio than peaches.

In 1868 the crop of peaches shipped from this port was about 525,000 baskets. In 1869 about 750,000. In 1870 about 157,000. In 1868 and 1869, I jarred the trees, using a sheet as others did. In 1870 I used nothing but the "Ransom method," as my friend Riley terms it.

Now compare the number of baskets of 1870 with those of 1869, and the crop will be seen to be from one-sixth to one-seventh; but my crop last year, 1870, fell only a little short of half as many as in 1869, and was as large as in 1868, (when I used a sheet,) into 102 baskets; while the ratio of 1868 to 1869 was about five-sevenths as many. I had about half as many in 1870, when there was only about one-seventh as many as in 1869, and my Late Crawfords bore well. In 1870 the freeze of April 16th, we all know, killed most of the early and late Crawfords, so that I had no Crawfords to raise the relative proportion of the two years.

Now, why was my crop about half as large in 1870 as the year before, with a full crop of Crawfords, while the general last year's crop averaged only about one-seventh? I know of no reason except the faithful attention I gave from about May 1st to July, in trapping the curculio. From the faith I had in the efficiency of

this method, and the want of faith among some prominent horticulturists, and the discouraging manner they spoke and wrote of it, I raised my back *a la curculio* to fully test its efficiency.

To show the result of this confidence, and to put all theorizing at rest, I will here state my most careful investigations and experience as to the loss of my last year's crop by the curculio. From previous statements it will be seen that my crop of 1870 bore about fifty per cent. ratio to the large crop of 1869, while the general ratio of last year was only about one-seventh of 1869.

I carefully picked from the ground and from the trees during the entire season, all wormy and blasted fruit. I cut this fruit carefully by hundreds to form as accurate an estimate as possible of the per cent of the wormy to blasted peaches. I counted at different times the number of these peaches in a basket. I estimated that for the season an average of 2,400 of these small peaches filled a basket. I picked the very smallest. I found the basket averaged about one half wormy and one-half blasted. Reducing all of those picked up to baskets, gave me the number of peaches destroyed by the curculio. Allowing 125 good fair ripe peaches as the average of a basket, gave me the number of baskets lost by curculio. The result was, (making estimates large enough) 257 baskets. In this estimate I was exceedingly careful, and I think I fully covered the loss, which I think was tribute enough to the curculio; 257 baskets at one dollar per basket is \$257. That was my last year's tax collected by his Mahamedan highness.

I will leave others to figure up and take their receipts for custom dues to his imperial majesty. I have asked a large number of fruit growers what per cent. of last year's peach crop they thought was destroyed by the curculio. None say less than half, many, *very many*, two-thirds.—With these estimates I agree as to the general crop. Some, however, lost all their peaches by the curculio. The peaches were saved in the ratio of the diligence used in destroying the curculio.

Now if half the crop was destroyed by them in 1870, and peaches brought \$1 per basket, they destroyed \$157,000 worth of peaches. If two-thirds were destroyed, this fruit region paid tribute to

them last year of \$314,000. I simply ask can we afford to pay it? I answer no. If there is any way to redress this evil, let us do it.

I am not speaking of any curculio but the one that attacks our cherries, peaches, and plums, and, so far as I know, the same one attacks our apples; for I have bred several from apples the past year, and they are all *conotrachelus*, and not of the *quadrigibbus* species. There are a hundred kindred species of snout beetles that are puncturing all fruits and nuts.—One species last year destroyed all the black walnuts on the rivers and streams in Kansas. Every species has its predilection for fruit.

Last year, the first and second days of May were warm, and brought the curculio from their hibernating places. Being on the watch for them, I began to study their habits, and gained a point in advance of what I learned the previous year. I examined in the cracks and crevices of the ground near the trees, and found them hid away. I then searched under leaves, sticks, and lumps of dirt. There I found them. This gave me the hint to save them the trouble of looking up a lodging place for themselves, so I smoothed down the ground and put down traps of various kinds and sizes until I found traps a success. I will here again say, that to succeed, the ground must be made smooth and clean, so as to give them no hiding place near the tree but the traps. The majority do not fly after entering the orchard, but remain on the ground during the early part of the season, except as they ascend the trees on warm nights to feed, and descend for shelter in the morning.

During this part of the season, I discovered no difference in any kind of traps if properly put around the tree. After the weather became warm, but few were found under stones or pieces of brick. I have used everything for a trap as an experiment. I like pieces of old dead black oak bark, from two to four inches square. Take that which has fallen off and worn the ross and little fibrous bark off, so as to have no cracks in it for the curculio to hide in. One side is concave, the edges are generally uneven, so that when put up to the tree they give holes for the beetle to crawl under next to the tree when descending. This hollow in the inner side of



the bark, when placed on the smooth ground, gives a sufficient vacuum for them to attach themselves to the bark and just clear the ground, which they seem to prefer. The traps want but a small space beneath, say a quarter of an inch, and all the edges *close to the ground, only just* so that a curculio can crawl under in several places. I prefer bark because it has a concave side, and does not warp with the sun, while most other traps warp and leave the edges too high and the centre too close to the ground. Lath, blocks, chips, bits of boards, (unless of the size we may suppose Mrs. Weirs' were, viz: building lumber), are either convex or warp with the sun and raise the edges, thus bringing the centre to the ground.—Observation and experience will teach any one to succeed. The traps must all be set over after a rain, as it closes the edges with dirt washed up around them.

I followed the traps daily from the first of May to the first of July. There were but few days that I did not catch curculio steadily. On June 23d, 24th and 25th, I caught about as many as any days after the first week's trapping, and more than on any but three or four days. On the 23d, 298; on the 24th, 361. The thermometer ranged from 96° to 104°. These curculio I am sure were not that year's brood. Some things I think I settled definitely about their habits.

On their first appearance in the spring they are active, nightly feeders, if it is sufficiently warm. They appear in the orchard as soon as it is warm enough to start the leaves and fruit buds. They feed voraciously on warm nights on the tender starting leaves.—When it is cold they do not feed. They ascend the trees just at evening and descend in the morning to find hiding places on the ground. A few will be found on the underside of the lateral limbs. They will principally hide under the nearest covert to the tree. Very few remain on the tree.

When the trees are in full foliage curculios will not all descend every day; but they travel a good deal except when the female is laying eggs fast and is sluggish. When not found under the traps daily, go through the orchard with a rubber mallet and jar the trees thoroughly as with a sheet, and let the beetles fall on the ground. In the afternoon you will have

most of them under the traps. To test the matter whether they feed nights only, and went down in the morning, which I had observed them doing frequently, the sun half an hour or so high. I went thro' the orchard to about a hundred trees, at 6 o'clock P. M., and found from five to ten to the traps of each tree. Then again about dusk I took my lantern and went to rows of trees alongside of those where I found them before sundown, and examined about the same number of traps and found only *one* curculio. Then the next morning at sunrise, I went to the same trees I visited with the lantern and found from five to ten under the traps of each tree. To see if lights would attract them I spent several warm nights until 10 or 11 o'clock burning bright fires with small brush; most other insects were attracted, but not a curculio, not one!

They probably, when under the traps, remain there during the day, so that perhaps it is well to examine them in the afternoon, and especially later in the season when it may be best to jar the trees in the morning, and then give them time to crawl under before examining the traps.

The curculio began here last year to deposit their eggs in about three weeks from their first appearance, or from May 20th to the 22d. The first peaches I found from which the larvae had escaped was from June 20th to the 26th. I put the larvae into a breeding jar June 26th; they immediately entered the ground.—Between July 20th and 26th the beetles began to come out. They usually pass from twenty to thirty days in the ground; the majority from twenty to twenty-five days. It thus stands very nearly: May 20th they begin depositing their eggs; June 30th the larvae begin entering the ground; July 20th the first beetles begin to come out of the ground.

Last year but few if any peaches were punctured by the curculio after the first of July. Not later than July 6th I am sure, if really as late as that. The only ripe peaches we find many worms in are Hale's Early, which began to ripen August 1st, and there are no peaches found with worms in of consequences after a week or ten days' picking, and these contain larvae nearly mature. This, allowing four weeks for them to mature in the peach, shows they do not deposit eggs



much if any after July 1st. Then, the more succulent and ripe the peach, the longer they remain in it, and the larger the larvae grows.

This settles beyond all doubt to my mind that we are cursed with only one good healthy, active working crop of curculio a year. I have no doubt but all curculio larvae perfect the beetle state and leave the ground the same year, no matter what time they enter the ground. I know it is thought the majority remain in the ground till the next spring. I believe every one transforms the same season. I kept them as late as Sept. 21st, before letting them enter the ground, and Oct. 16th an examination showed the perfect beetle, black but not yet emerged from the transforming cavity. About June 25th I put dry hard little peaches containing larvae in a jar without dirt or moisture. They will not die for a long time. They will not transform except in the earth. Many of these I kept till into September. During the summer I took larvae at different times from this jar and examined them, and put them in earth, from which as usual they went through the transformation in 20 to 30 days. All the old horticultural works, as well as many horticulturists, now think they remain in the ground until the next spring. This is disproved beyond a doubt to my mind. The number of eggs a single female will deposit in one season remains unknown so far as my knowledge goes.

As to their hibernating locality, or place they have the mastery of me. I have prepared what I supposed were attractive places in my orchard for them, and day after day examined them with care, and also other places, late last fall and this winter, but am yet ignorant of where the beetles pass the winter, except what others say; of which I am very distrustful. From the testimony of many it seems that they gather in numbers in old stumps, logs, and under the bark of trees or timber. But this thing needs further investigation. If true it may give some further clue to their future destruction.

Perhaps I should speak of Prof. Riley's parasites of which he has written. I have seen them and tried hours to have one feast on a good fat curculio egg, from which he turned continuously, as much as

to say: *No, I thank you sir.* And as to his selling Illinois fruit growers next year a parasite that destroys the mature larvae, I fear he has stolen my *thunder*.—When he was here in last June, I showed him the parasite larvae, which was new to him, and he requested me to breed some.

I can furnish him a pair *now* to go into their propagation in advance of waiting until next summer to supply Illinois horticulturists at \$1 or \$2 a pair. Michigan will keep under her curculios with the Ransom traps if we attend to it as we should. I have here in this vial some of the perfect fly of this new "Michigan" parasite, so that when Prof. Riley begins to sell, you may all know it in advance of his sending them forth to the world claiming its discovery. This little wasp-like fly as you will see its ovipositor can reach the curculio larvae in the peach and deposit an egg on it, which grow together until the parasite larvae kills the curculio larvae, and then furnishes itself a cocoon and transforms in the same peach. I bred large numbers last year. If they should increase much, they will be of some use to us in killing the curculio larvae; unless we export them to Missouri, Illinois or somewhere else so as to have a short supply here. There are many things remaining of much importance, which I have not time to present; as I have already trespassed long on your patience. Discoveries remain to be made as to their natural habits. Do they live on from year to year? How many eggs does a single female lay? What length of time is consumed in laying? where do they hibernate? Let these be fully settled. Is it known certainly that birds eat the beetles? Do hens or chickens eat the beetles? I think toads do, although I am not positive. We all need to study further the habit of this little insect. Let the name curculio, which sounds from Maine to Florida, from the Atlantic coast to the Rocky mountains: which echoes from the valley, from the plain, and from the mountain tops, be the tocsin note in the ears of every fruit grower, to arise like the angel of death and *sugar* that his crescent mark, shall be the insignia of his doom; that the curculio shall be no more. That our *fair fruits* shall blush in the sun beams without his unhallowed touch.



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